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EX PARTE OR LATE FILED

November 4, 1997

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
Room 222
1919 M Street, N. W.
Washington, D.C. 20554

Re: PR Docket No. 92-235
Ex Parte Presentation

Dear Mr. Caton:

On Monday, November 3, 1997, the undersigned, together with Stan Jenkins, Boeing; Thomas J. Callis and Bob Beckman, Telemotive; and Larry Fineran, National Association of Manufacturers, met with D'wana Speight, Legal Advisor to Wireless Bureau Chief Dan Phythyon, and Ira Keltz, Wireless Telecommunications Bureau, regarding MRFAC's Petition for Clarification or, In the Alternative, for Declaratory Ruling in the above-captioned proceeding.

The points made during the meeting are reflected in MRFAC's Petition and the attached material.

An original and one copy of this letter is supplied for inclusion in the Commission's Docket file.

Sincerely,

William K. Keane
Counsel for MRFAC, Inc.

cc: D'wana Speight
Ira R. Keltz

MRFAC'S MESSAGE

- MRFAC strongly supports spectral-efficient technologies. Re-farming offers that potential. Services provided commercially to the public should be licensed only by auction.

- Seven-month migration period should only begin upon approval of LMCC Plan.

- Grant clarification or declaratory ruling for incumbent licensees to migrate to LMCC-designated low power channels with 25 kHz equipment and achieve:

  - Primary status with showing of spectral efficiency and coordinates

  - Secondary status for other incumbents

- Same as above for new licensees showing spectral efficiency.

* * * *

Rationale: Commission's Orders stress goals of improving spectral efficiency and allowing users a graceful transition not driven by regulatory mandates. MRFAC's proposal would accomplish this by avoiding requirement that any user seeking primary status on designated low power channels replace perfectly-serviceable, spectrally efficient (e.g. TDMA) 25 kHz equipment in order to achieve that status; would avoid saddling thousands of users with the need for waiver requests of bandwidth rule; and would avoid burdening the Commission with the need to pass on such requests. Instead, the Commission would rely on the coordination process for review and recommendation regarding such applications.

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

FCC 95-255

In the Matter of	)	
	)	
Replacement of Part 90 by Part 88 to	)	
Revise the Private Land Mobile Radio	)	
Services and Modify the Policies	)	
Governing Them	)	
	)	PR Docket No. 92-235
and	)	
	)	
Examination of Exclusivity and	)	
Frequency Assignment Policies of	)	
the Private Land Mobile Radio Services	)	

REPORT AND ORDER AND FURTHER NOTICE OF PROPOSED RULE MAKING

Adopted: June 15, 1995 **Released: June 23, 1995**

Comment Date: September 15, 1995
Reply Comment Date: October 16, 1995

By the Commission:

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today establish a new channelling plan and provide technical flexibility which will enable private wireless users to make equipment investment decisions to accommodate their diverse needs. We have also made certain modifications to our regulatory and technical framework for the PLMR services and have incorporated those rule modifications into Part 90 of the Commission's Rules. Consequently, we have decided not to replace Part 90 of the Commission's Rules, 47 C.F.R. Part 90, with Part 88 at this time.

2. Our primary goal in this proceeding has been to develop an overall strategy for using the spectrum in the PLMR allocations more efficiently to meet future communications requirements. This is an era of unparalleled advances in mobile radio technology. It is also an era of unparalleled demand for radio spectrum to provide the exciting array of new wireless services. Because of the many special characteristics of the private radio services, such as spectrum sharing and no-cost spectrum use, it has been particularly difficult to encourage spectrum efficiency in these bands. We seek, in this proceeding, to ensure the provision of essential private wireless services, and to provide marketplace incentives to enhance spectrum efficiency so as to satisfy PLMR demand well into the 21st century. Realizing this goal has proven to be complex because this proceeding attempts to introduce new technologies and regulations into heavily-licensed, shared spectrum. Also, many licensees, such as public safety entities, have special communications needs. Further, in many cases, the new assignments in these bands are needed by the same group of users that are being displaced. In this regard, we note that the spectrum in the frequency bands under consideration in this proceeding supports over 12 million transmitters with an aggregate value of $25 billion dollars.[2] We believe that the changes we make today represent a significant first step towards establishing a technical and policy framework for the PLMR service that will permit and encourage more efficient use of the spectrum and help chart the course to meet the future demand for private wireless services.

3. In sum, the decisions made in this proceeding represent reforms that introduce regulatory flexibility and seek to introduce marketplace forces into the private wireless environment. In reaching the decisions that are set forth in this item, we have been guided by the following objectives:

> (1) to provide technical flexibility which enhances deployment of new technologies and promotes a competitive and robust marketplace for product development;
>
> (2) to provide a regulatory structure which allows private licensees and equipment manufacturers the opportunity to introduce new applications and enhancements to existing services;

3-4

[2] Letter from User Associations to William F. Caton, Federal Communications Commission (p. 5), dated January 13, 1995.

(3) to create policies which address the diverse communications requirements of the wide array of large and small private wireless users and enable these licensees to make equipment investment decisions which best satisfy their business needs; and

(4) to create incentives to encourage the efficient and intensive use of the spectrum and to ensure that users recognize the opportunity cost of inefficient spectrum use.

4. In the Further Notice of Proposed Rule Making (FNPRM) section of this item we seek to determine how certain market-based incentives such as exclusivity with the right to lease excess capacity, spectrum user fees, and/or competitive bidding can be introduced into these PLMR bands to promote more efficient use of this spectrum. The introduction of these market-based tools will provide users with appropriate incentives to employ the most advanced technology and maximize the efficient use of the spectrum. This proceeding has been a forum to conduct a comprehensive review of the private land mobile radio services. We believe that the further exploration of these initiatives is particularly important during this period of profound change in mobile radio. We acknowledge the longstanding tradition of private mobile radio services to provide for the safety and general welfare of the American populace and promote the economic vitality of this country's commerce and industrial structure. We note, however, that many private communications services can be successfully satisfied by third-party commercial carriers as evidenced by the success of specialized mobile radio (SMR) systems. In soliciting further comments on exclusivity, we explore several policy questions related to commercial-type activities, such as the leasing of excess capacity. In addition, we seek comment on the introduction of user fees, and/or competitive bidding to encourage spectrum efficiency.

II. EXECUTIVE SUMMARY

5. This proceeding commenced in order to explore options to promote the more effective and efficient use of the PLMR spectrum bands. Although, the immediate problem the Commission sought to address was frequency congestion, the Commission's broader objective was to develop a regulatory strategy which promotes more efficient use of the existing spectrum allocations to satisfy future private land mobile telecommunications requirements. Since this proceeding was initiated over four years ago much has changed in our approach to managing spectrum. In the Omnibus Budget Reconciliation Act of 1993 (Budget Act), Congress granted the FCC authority to use auctions to award spectrum licenses when mutually exclusive applications were received for initial licenses of subscriber-based services. Since receiving auction authority less than two years ago, the Commission has completed four auctions assigning 40 Narrowband Personal Communications Service (PCS) licenses, 594 Interactive Video Data Service (IVDS) licenses and 99 Broadband PCS licenses. We have determined that auctions spur the rapid introduction of a wide array of new products and services that will increase competition and bring lower prices for

consumers. As a result of our experience with auctions, we have concluded that using competitive bidding to award licenses, as compared with other licensing mechanisms, speeds the development and deployment of new services and encourages efficient use of the spectrum. In this regard, we note that auctions generally award licenses quickly, to those parties who value them the most highly and who are therefore most likely to introduce service rapidly to the public.[3]

6. Currently, the Commission does not have statutory authority to conduct auctions or impose user fees in the PLMR bands. However, the Administration's FY 1996 budget proposes that the Commission's authority to use competitive bidding be expanded. Expanded auction authority and the imposition of fees to encourage more efficient distribution and use of the spectrum underlies the budgetary assumptions in the FY 1996 Senate Budget Resolution.[4] User fees or competitive bidding may be appropriate to encourage greater spectrum efficiency and to ensure that the public receives a "fair return" for spectrum.[5] Therefore, we seek comment in the FNPRM on the use of market-based user fees and competitive bidding as tools to introduce market-based incentives into these private wireless bands. However, because public safety entities are charged with the protection of human life and property, we propose to exempt them from user fees and competitive bidding.

7. In order to achieve our objective of increasing the efficiency of the PLMR frequency bands, we adopt changes to our technical rules and seek comment on the introduction of certain market-based incentives as follows:

- We establish a narrowband[6] channel plan based on current channel centers.[7]

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[3] Implementation of Section 309(j) of the Communications Act - Competitive Bidding, PP Docket No. 93-253, Competitive Bidding Second Report and Order, 9 FCC Rcd 2348, 2358 (1994).

[4] Senate Committee on Budget, Concurrent Resolution on Budget for FY 1996 to accompany S. Con. Res. 13, S. Rep. No. 104-82, 104th Cong., 1st Sess. 199-200 (1995).

[5] See letter from AT&T to William F. Caton, Federal Communications Commission, dated April 26, 1995 and letter from Linear Modulation Technology Limited to William F. Caton, Federal Communications Commission, dated May 16, 1995.

[6] In this document, narrowband or NB refers to channel spacings of 7.5 kHz in the VHF PLMR band and 6.25 kHz in the UHF PLMR bands, or channel bandwidths of 6.25 kHz or less in all PLMR bands unless specified otherwise. We will refer to NB technology or NB equipment to include all advanced technologies designed to operate with channel bandwidths of 6.25 kHz or less or equipment with 6.25 kHz equivalent efficiency such as TDMA (2 channels in 12.5 kHz or 4 channels in 25 kHz).

Technology that provides either narrowband or the equivalent efficiency will be allowed. We allow the flexibility of aggregating up to the equivalent of 4 NB channels provided that spectrum-efficient technology is employed (e.g. 4-TDMA in 25 kHz). This approach will enable users to employ the most spectrally-efficient technology available, while causing the least disruption to their own and other existing operations. This channeling plan establishes a channelization framework that is flexible, technology-neutral, and can easily be adapted to user fees or competitive bidding, if authority to use these mechanisms is obtained.

- Users will not be required to replace existing systems; rather, we will manage the transition to narrowband equipment by type accepting only increasingly efficient equipment over a ten-year period. Pursuant to this transition plan, after August 1, 1996 only equipment that operates with a 12.5 kHz or less channel bandwidth will be type accepted. However, multi-mode equipment that operates on 25 kHz channels will be allowed if it is also capable of operating on 12.5 kHz and/or narrower channels. Single mode equipment that operates on wider channels (up to 25 kHz), but which meets narrowband efficiency standards will also be allowed. After January 1, 2005, only equipment that operates on narrowband channel bandwidths will be type accepted. Multi-mode equipment that operates on 25 kHz and/or 12.5 kHz channels will be allowed if it is also capable of operating on 6.25 kHz or narrower channels. Similarly, single mode equipment that operates on wider channels (up to 25 kHz), but which meets narrowband efficiency standards will be allowed. This transition plan will provide users with maximum flexibility to continue using their existing equipment or employ the transitional 12.5 kHz equipment until a full line of affordable narrowband equipment is available. It also provides manufacturers with incentives to develop and market narrowband equivalent technology over a relatively short period.

- We also conclude that the PLMR service groups must be consolidated and that competition should be introduced into the coordinator services for each service group. Consolidation of the service groups will provide for more efficient allocation of the increased capacity created by the introduction of more efficient technology. We indicate that two to four broad categories, including one for Public Safety users, appears reasonable. We believe, however, that consolidation can be accomplished most effectively by providing the industry with three months to negotiate and submit a consensus consolidation proposal to the Commission. The consolidation plan should provide for competition among coordinators in each of the consolidated user

[7] Throughout a transition to narrowband technology, licensees will be permitted to remain on the frequencies on which they are currently licensed.

spectrum relief in especially congested areas and supports 12.5 kHz channels for both VHF and UHF frequencies.[61]

23. In its comments, the Academy of Model Aeronautics (Academy) claims, "... that the Commission's proposals for the 72-76 MHz band will have a disastrous effect on an industry with annual sales in excess of $1 billion..."[62] The Academy further states that, "[t]he proposed rules create the possibility that 1-watt land mobile transmitters may be employed in proximity to the R/C modeling activity at random and without warning."[63] The Academy said that because these models, which weigh between 5 and 12 pounds and fly at speeds up to 90 MPH, are frequently flown at events where spectators are present "... it is absolutely critical that the operator of the aircraft be able to control its flight at all times."[64] This view was supported by hundreds of informal letters from individuals, model enthusiasts, and Congressional inquires.

24. Decision. Based on the extensive record on this issue, we have decided to modify our proposed channel spacing plan. We will adopt a channelization plan based on narrowband (NB) channel spacings. Regarding the 72-76 MHz band, we will maintain the existing spacings. Most of the record focuses on making improvements in the four PLMR "main-haul" frequency bands: 150-174, 421-430, 450-470, and 470-512 MHz. We will list channels every 7.5 kHz in the 150-174 MHz VHF band and every 6.25 kHz in the 421-430, 450-470, and 470-512 MHz UHF bands, but allow a flexible approach whereby users can choose equipment which best fits their needs by aggregating up to the equivalent of four narrowband channels.[65] Although channels are listed at narrowband spacings, this approach provides users with the option of utilizing equipment designed to operate with either 5, 6.25, 12.5, or 25 kHz channel bandwidths. Our reasons for reaching these decisions are set forth below.

25. In choosing narrowband as the basis of our channelization plan, we considered

Manual of Regulations and Procedures for Federal Radio Frequency Management at § 4.3.7.

[61] Comments of APCO at 21.

[62] Comments of The Academy of Model Aeronautics at 1.

[63] Comments of The Academy of Model Aeronautics at 11.

[64] Comments of The Academy of Model Aeronautics at 13.

[65] In light of our "on-channel" channelization plan, licensees who desire to aggregate channels for use with 25 kHz equipment would actually need portions of five narrowband channels - the channel corresponding to their center frequency, both first adjacent channels, and one-half of each second adjacent channel. Likewise, 12.5 kHz operation would require the use of portions of three narrowband channels.

spacing, i.e., generally 15 kHz at VHF and 25 kHz at UHF. This plan would have the advantage of using current equipment, but similar to channelizing on 12.5 kHz, there would be no gain in the number of communication channels available to users. Thus, we find that leaving the existing channel spacings garners few benefits to the user community.

26. Upon consideration of the factors summarized above, we conclude that the best approach is to establish a narrowband channel plan that also allows users the flexibility to aggregate channels to allow them to employ wider band equipment when it best suits their communications requirements. Generally, we will list assignable channels every 7.5 kHz in the VHF band and every 6.25 kHz in the UHF bands based on current channel centers. Channelizing on current channel centers ("on-channel") will allow users to remain on their current licensed frequency throughout a transition to narrowband. Remaining on-channel was seen as critical to existing licensees. As emphasized by existing users, on-channel transition will minimize confusion and provide a simpler migration path. Adopting a 7.5/6.25 kHz narrowband channelization plan rather than the 5/6.25 kHz plan proposed will accommodate, not only 5 kHz, but also 6.25 kHz equipment without any restrictions. Finally, for example, in order to accommodate the wide variety of licensees and their varied uses of PLMR, we will allow the use of wideband equivalent technologies, e.g. TDMA, across an aggregation of narrowband channels.

27. Since we are allowing the use of wideband equipment, we are also taking steps to reduce instances of detrimental adjacent channel interference and generally make a transition to narrowband technology easier on PLMR users. To this end, we will place some restrictions on the maximum bandwidth that can be used on certain channels in the refarming bands. In the 150-174 MHz band, licensees may use equipment designed to operate with a channel bandwidth of 25 kHz or less on any channel available prior to the effective date of the rules adopted in this proceeding. Only equipment designed to operate with a channel bandwidth of 12.5 kHz or less may be used on any of the channels 7.5 kHz removed from any existing channel.[69] In the 421-512 MHz band, licensees may use equipment designed to operate with a channel bandwidth of 25 kHz on channels available prior to the effective date of the rules adopted in this proceeding. Only equipment designed to operate with a channel bandwidth of 12.5 kHz or less may be used on any of the channels 12.5 kHz removed[70] from any existing channel and only equipment designed to operate with a channel bandwidth of 6.25 kHz or less may be used on any of the channels 6.25 kHz removed from any existing channel. Additionally, the particular operating environment of each licensee may dictate that separation requirements be imposed by the frequency coordinators. See infra, para. 76 on

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[69] Existing channel refers to any channel available prior to the effective date of the rules adopted in this proceeding.

[70] Users currently licensed for 25 kHz operation on any of the low power offset channels will continue to be licensed for such operation until they decide to transition to narrowband equipment.

the use of separation requirements for wideband (25 kHz or 12.5 kHz) equipment. Also, the use of wideband equipment will be subject to certain efficiency standards.

28. Finally, regarding 12.5 kHz equipment which does not meet our narrowband efficiency standard, we will allow licensees to use true 12.5 kHz equipment during a transition to narrowband technology.[71] This is supported by a majority of users who want to implement equipment designed to meet the 12.5 kHz APCO-25 technical standards. Therefore existing users, who desire to transition to NB, will have the option of transitioning in one step directly or more conservatively via two steps: first to 12.5 kHz then to NB technology. It also will allow users in extremely congested markets to double their capacity almost immediately by employing readily available 12.5 kHz equipment. This approach provides licensees additional flexibility during the transition to select technology best suited to their needs and minimize the impact to their operations. This is consistent with the majority of the commenters. In particular, public safety argued that permitting an intermediate 12.5 kHz step is essential to providing a smooth migration path for existing operations.

29. In summary, our approach does not favor any particular type of land mobile technology, but adopts rules that permit the use of new spectrum efficient technologies. This provides technical flexibility by removing current barriers to allow entry of new technology into the private land mobile marketplace. It permits the use of narrowband channels for voice communications and slow-speed data transmissions while also allowing users with requirements for wideband technologies, such as high-speed digital and data transmissions, to employ them. This decision recognizes the operational requirements of a large, diverse community of users and provides a plan that enables the PLMR community to substantially increase the spectrum efficiency of these bands. This approach is consistent with the User Coalition Plan and includes the following benefits: better data transfer capabilities and lower equipment costs than our proposed plan, and technical neutrality -- allowing for 5, 6.25, 12.5 or 25 kHz equipment. This channelization plan provides regulatory flexibility to both users and manufacturers. By adopting a NB channelization plan, we set the direction for the industry to meet our long term goal of increasing the efficiency of the PLMR frequency bands. Moreover, this plan is technology neutral -- it allows all manufacturers and modulation techniques to compete in an open marketplace. It satisfies concerns expressed by many parties, particularly the public safety community and users, such as railroads, who provide critical functions, that the plan include options permitting the selection of proven technology, including portable and feature-rich products. Further, these parties argue that reliable radio service must be maintained during the transition to NB. This plan allows users to review all technology options, solicit competitive bids if appropriate, and choose whichever system is best suited to their communications needs. Moreover, it allows market forces to govern technology and equipment selection based on price and actual performance

[71] A few channels, designated for use as low power and itinerant stations in the Business Radio Service, will remain 12.5 kHz channels. See paragraph 89.

retain primary status.[80] As stated previously, this plan has the support of approximately 95% of the user community. Also in support of using the type acceptance process to stimulate the transition to narrowband technologies, Motorola states that the Commission should, "[r]equire through the type-acceptance process that manufacturers begin populating the market with true 12.5 kHz capable equipment, ensuring a smooth migration for users."[81] To this end, Motorola recommends that after January 1, 1996, the Commission should no longer type accept equipment that cannot be readily converted to 12.5 kHz operation.[82] APCO comments that after two years of the effective date of the Report and Order, equipment should not be manufactured or type accepted unless it meets stated requirements.[83] NABER proposes a two step plan in which Step One involves the discontinuation of type acceptance for new 25 kHz or 30 kHz analog equipment as soon as practical.[84]

35. **Decision.** Determining an appropriate transition period for rechannelization requires balancing the economic and operational impacts of existing users. Many comments note that the transition from the current 25-30 kHz equipment to narrowband technologies involves a substantial replacement of system infrastructure. Existing licensees emphasize that they have over $25 billion dollars invested in imbedded equipment and much of that equipment is not compatible with narrowband technologies. Although users state that many systems last between 15-20 years, there was general agreement that 10 years (at 10 percent change-out per year) was a reasonable transition cycle. Following this reasoning, the User Coalition Plan, as described above, contemplates two replacement cycles and requests a 26 year transition period.[85]

36. We have decided to manage the transition to more spectrum efficient use of the PLMR frequency bands by the type acceptance process as suggested by the User Coalition Plan, Motorola, and others. We are requiring that future equipment meet increasingly efficient standards over a ten year period. With the introduction of market-based incentives as discussed in the FNPRM, this plan will permit and promote a natural migration to new technologies.

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[80] Letter from User Associations to William F. Caton, Federal Communications Commission, dated January 13, 1995.

[81] Comments of Motorola at v.

[82] Comments of Motorola at 24.

[83] Comments of APCO at 15.

[84] Comments of NABER at 20.

[85] The 26 years provides two cycles as follows: 16 years to convert from 25 kHz analog to 12.5 kHz digital systems (that is, APCO-25 type equipment) plus 10 years to convert from 12.5 to 6.25 kHz digital equipment.

37. The discussion regarding channelization has been dominated by concerns regarding time frames for introducing narrowband technology.[86] The comments generally discuss extended schedules, e.g., 26 years in the User Coalition plan. Most of these time frames conservatively favor full amortization of equipment, and assume unnecessarily long lead times for development and marketing of new narrowband technologies. We have decided to adopt a plan that provides a flexible framework within a much shorter period of time by which market-based incentives can be introduced into these private wireless bands. In contrast to many comments and the User Coalition plan, we have decided not to implement a comprehensive set of dates mandating strict manufacturing and licensing requirements. Rather, we conclude that the best approach is to specify type acceptance dates to guide the transition process. Recognizing that there is over $25 billion in equipment investment in these PLMR bands, we will provide users immediate flexibility in equipment decisions and provide a period for the development of new technologies. This transition plan provides users the option of continuing to use existing equipment, transitioning immediately to more efficient narrowband equipment, or waiting until a full line of affordable narrowband equipment is available and costs become competitive, before changing out their systems. Thus, this plan allows each licensee the freedom to choose equipment and a transition schedule that best fulfills their needs while balancing technical capabilities and financial considerations. Since the rules we are adopting provide a great deal of flexibility to each individual licensee by being permissive rather than restrictive, requiring both rural and urban users to comply with them will not create an unreasonable burden.

38. The transition dates for the type acceptance rules we are adopting are as follows:[87]

August 1, 1996 - New type accepted equipment must be designed to operate on channels of 12.5 kHz or less or on 25 kHz channels if the narrowband efficiency standard is met (multi-mode equipment that operates on 25 kHz channels will be allowed if it is also capable of operating on 12.5 kHz and/or narrower channels).

January 1, 2005 - New type accepted equipment must be designed to operate on channels of 6.25 kHz or less or on channels up to 25 kHz if the narrowband efficiency standard is met (multi-mode equipment that operates on 25 kHz and/or 12.5 kHz channels will be allowed if it is also capable of operating on 6.25 kHz or narrower channels).

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[86] A diagram of migration options that users may employ during the transition period is provided in Appendix A, Figure 6.

[87] Different provisions apply for paging, "color dot," and itinerant channels (see discussion later in document).

39. Our plan requires manufacturers to begin providing narrowband equipment over the next ten years. This ten year transition schedule is supported by the PLMR community.[88] Ten years affords PLMR users and manufacturers sufficient time to develop technical standards for narrowband radios and to design and test such radios. It is essential to allow sufficient time for the establishment of these standards in order to ensure that users will have the option of purchasing interoperable radios from multiple vendors. Further, this time period will provide ample time for different modulation techniques to be studied for compatibility and interference effects. Finally, since 5 kHz systems are currently allowed in the 150-170 MHz band[89] and 5 kHz systems are proliferating in the 220-222 MHz band, we believe that it is reasonable to expect manufacturers to produce 6.25 kHz equipment in the refarming bands within ten years.[90]

40. The Commission's type acceptance rules provide some flexibility by which manufacturers can continue to support their existing equipment through upgrades and modifications. Wideband equipment can continue to be produced, but these radios must include a multi-mode feature.[91] We believe that as systems wear out, and new radios are bought, users, will have a natural inducement, without a Government mandate, to use the narrower bandwidth of the multi-mode radios in order to avoid excessive adjacent channel interference. This will allow a natural transition to more efficient systems as new equipment is bought within each users normal replacement cycle. We also believe that a natural inducement exists for all users, especially those located in congested areas, to migrate to narrowband equipment as it becomes available. The use of narrowband technology will ease congestion because more channels may be used in a common geographic area. Finally, this plan maintains flexibility to introduce additional market-based incentives into these bands. We discuss these incentives to encourage greater spectrum efficiency in more detail in the FNPRM.

41. One additional aspect of our plan concerns licensing on some of the new

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[88] Letter from American Petroleum Institute, Association of American Railroads, Industrial Telecommunications Association, Inc., APCO-International, Inc., Utilities Telecommunications Council, and the International Association of Fire Chiefs, Inc. and International Municipal Signal Association to Chairman Reed E. Hundt, Federal Communications Commission dated June 5, 1995.

[89] 47 C.F.R. § 90.271 allows the use of narrowband operation on frequencies 2.5 kHz or 7.5 kHz removed from regularly assignable frequencies in the 150-170 MHz band.

[90] Letter from Ericsson to William F. Caton, Federal Communications Commission, dated April 27, 1995, and comments of Securicor at 4 and 5.

[91] Equipment that is type accepted prior to each of the transition dates may continue to be manufactured and used indefinitely. For example, a 25 kHz radio that is allowed today can still be manufactured after August 1, 1996.

geographic area occupied by the signal and the time required to achieve the communications."[165] Others strongly agreed with our approach. For example, SEA notes that "the logistics of the implementation of any alternative to the Commission's enforcement of a simple standard is conspicuously absent from the comments."[166] GEC-Marconi recommends a standard of 1.28 bits/second/Hertz as a long term efficiency objective.[167] Finally, we note that the comments contained considerable discussion on potentially attainable spectrum efficiencies. Other possible formulas suggested in the comments suffer from the defect that the suggested spectrum efficiency measure would depend on the specific use, thus creating a significant compliance problem. For example, information per second per hertz depends on the exact nature of the information being communicated. Even a less elusive measure like bits per second per hertz per square kilometer depends on antenna gain and height, which varies from applicant to applicant.

97. Decision. After considering the comments on this issue, we are adopting our proposal contained in the Refarming Notice with minor modification. Although different efficiency standards were proposed for the VHF and UHF bands, we are adopting a common standard for all the refarming bands. In accordance with the transition dates for equipment in the 150-174 MHz VHF and 421-512 MHz UHF bands, we are adopting a spectrum efficiency standard of one voice channel per 12.5 kHz of channel bandwidth for equipment type accepted after August 1, 1996, and a spectrum efficiency standard of one voice channel per 6.25 kHz for equipment type accepted after January 1, 2005. Additionally, after August 1, 1996, equipment designed for data operation that uses more than a 6.25 kHz channel bandwidth, must meet a minimum efficiency standard of at least 0.768 bits per second per Hertz.[168] At the chosen standard of 0.768 bps/Hz, the 6.25 kHz equipment will have a data rate of 4800 bps, and the 12.5 kHz equipment will have a data rate of 9600 bps. These are standard data rates. Based on the comments, we believe that this standard is readily attainable. This standard will be incorporated into the type acceptance process by having equipment manufacturers certify as part of their application for type acceptance that their equipment meets the spectrum efficiency standard. Therefore, licensees and new applicants would be assured that any equipment they purchase would comply with the spectrum efficiency standard.

(8) Itinerant and Color Dot Frequencies.

98. Proposal. The Refarming Notice proposed that 45 VHF and UHF frequencies

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[165] Comments of Ericsson at 15.

[166] Reply Comments of SEA at 6.

[167] Comments of GEC-Marconi at 14.

[168] Equipment designed for voice and data operation must meet the efficiency standards for both voice and for data.

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Replacement of Part 90 by Part 88 to	)	PR Docket No. 92-235
Revise the Private Land Mobile Radio	)	
Services and Modify the Policies	)	
Governing Them	)	
	)	
and	)	
	)	
Examination of Exclusivity and	)	
Frequency Assignment Policies of	)	
the Private Land Mobile Radio Services	)	
	)	
	)	
	)	
Amendment of the Commission's Rules	)	PR Docket No. 92-257
Concerning Maritime Communications	)	

MEMORANDUM OPINION AND ORDER

Adopted: December 23, 1996 **Released:** December 30, 1996

By the Commission:

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III. DISCUSSION

A. Channel Plan

5. The Commission set forth a channel plan which allows the spectrum to be "cultivated" by new, more efficient narrowband (NB) technologies.[6] The Commission adopted a channel plan in the *R&O* based on 7.5 kHz channel spacing in the 150-174 MHz VHF band and 6.25 kHz channel spacing in the 421-430 MHz, 450-470 MHz, and 470-512 MHz UHF bands.[7] Flexibility is provided to licensees by permitting them to aggregate up to four narrowband channels to employ spectrum efficient wideband technology.[8] Additionally, licensees are provided with a simple migration path because they will be able to remain on their currently assigned center frequencies[9] and can continue to use existing equipment while they upgrade to new equipment.[10]

6. *Petitions.* Securicor Radiocoms Limited and Linear Modulation Technology Limited (Securicor), Midland International Corporation (Midland), E.F. Johnson Company (E.F. Johnson), and Nippon Telegraph and Telephone Company (NTT) request reconsideration of the new channel plan.[11] They request that we adopt a channel plan based on 5 kHz channel spacing. Both Securicor and E.F. Johnson state that the Commission's decision to space channels at 7.5 kHz creates inefficient "white spaces" in the VHF band.[12] Additionally, they assert that the ability to use wideband equivalent technologies by aggregating narrowband channels is not taken into account in our rationale for rejecting 5 kHz spacing.[13] Securicor, a manufacturer of 5 kHz equipment, states that 5 kHz channel spacing would provide a smooth transition to advanced

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[6] Narrowband or NB refers to channel spacing of 7.5 kHz in the VHF PLMR band and 6.25 kHz in the UHF PLMR bands, or channel bandwidths of 6.25 kHz or less in all PLMR bands unless specified otherwise. NB technology or NB equipment includes all advanced technologies designed to operate with channel bandwidths of 6.25 kHz or less or equipment with 6.25 kHz equivalent efficiency such as time division multiple access (TDMA) (2 channels in 12.5 kHz or 4 channels in 25 kHz).

[7] *See R&O* at para. 24.

[8] *See id.* at paras. 24 and 26.

[9] A center frequency is the frequency at the center of the frequency band assigned to a station. *See R&O* at Appendix A, Figures 3 - 6.

[10] *See R&O* at paras. 24 - 29.

[11] Securicor Petition for Reconsideration at 9; Midland Petition for Reconsideration at 2; E.F. Johnson Petition for Reconsideration at 2; NTT Comments on Petition for Reconsideration at 5.

[12] E.F. Johnson Petition for Reconsideration at 3; Securicor Petition for Reconsideration at 11. "White spaces" are portions of spectrum that remain unoccupied.

[13] E.F. Johnson Petition for Reconsideration at 4; Securicor Petition for Reconsideration at 15-17.

suitable contiguous channels. Thus, the 7.5/6.25 kHz plan eases the transition for current users, such as businesses and public safety organizations, who desire to implement a two-step transition to narrowband through 12.5 kHz equipment.

9. Petitioners also assert that inefficient white spaces are created by our adopted channel plan, since 12.5 kHz VHF equipment would actually use 15 kHz of spectrum by aggregating two 7.5 kHz VHF channels. However, to use 12.5 kHz equipment in a plan based on 5 kHz channels would also require licensees to use 15 kHz of spectrum because they would have to aggregate three 5 kHz channels. In the UHF band, 12.5 kHz equipment also would use 15 kHz of spectrum in a 5 kHz channel plan, but only 12.5 kHz of spectrum in the adopted plan. Furthermore, a 5 kHz channel plan would require users who choose to implement 6.25 kHz equipment to acquire the same 15 kHz of spectrum needed for 12.5 kHz equipment.[21] Thus, a 5 kHz channel plan would create as much or more white space than the channel plan we adopted.

10. Finally, with respect to the economic analysis submitted by Securicor, we do not dispute the general contention that smaller channels will lead to more potential users. However, we find that Securicor has not provided a comprehensive analysis because it only looks at the benefits of transitioning to narrower equipment and fails to address the associated costs, such as the cost and availability of radios. We believe that once such costs are taken into account, the channel plan we adopted is the more well-reasoned approach because it accommodates a variety of technologies. Thus, users are provided more choices to implement new systems within their own technical and budgetary constraints.[22]

11. Consequently, we conclude that our adopted 7.5/6.25 kHz channel plan is more flexible than a 5 kHz plan because it will accommodate users of 25, 12.5, 6.25, and 5 kHz equipment while accomplishing our goal of increasing spectrum efficiency. Further, this channel plan creates a flexible migration path, which is considered a critical factor by current users. For these reasons, we decline to modify the channel plan as adopted in the *R&O*. However, we are mindful of the fact that some users may want to implement 5 kHz technology within their existing 25 kHz bandwidth. For example, a licensee could fit five 5 kHz channels within its existing 25 kHz bandwidth. Such a channelization, however, would require the licensee to deviate from the adopted band plan. Therefore, we will permit frequency coordinators to recommend frequencies inconsistent with the adopted band plan, for any technology, including 5 kHz, provided that such a system will not cause harmful interference to any existing system.

[21] Equipment designed to operate with a 6.25 kHz bandwidth overlaid on a 5 kHz channel would use its own channel plus 0.625 kHz of each adjacent channel. Therefore, a user would need to aggregate three 5 kHz channels.

[22] *See* R&O at para. 37. The *R&O* detailed the advantages and disadvantages of several channel plans including 2.5 kHz, 5 kHz, a combination of 5 kHz and 6.25 kHz, a combination of 7.5 kHz and 6.25 kHz, 12.5 kHz, and the existing 25 kHz. After consideration of each of these plans, we adopted the channel plan based on 7.5 kHz channel spacing in the VHF band and 6.25 kHz channel spacing in the UHF bands.

C. Spectrum Efficiency Standards

19. In the *R&O*, we adopted spectrum efficiency standards for newly type accepted equipment at each transition date.[41] Specifically, we require at least one voice channel per 12.5 kHz of channel bandwidth for equipment type accepted after August 1, 1996, and at least one voice channel per 6.25 kHz of channel bandwidth for equipment type accepted after January 1, 2005. Additionally, after August 1, 1996, equipment designed for data operation must be capable of supporting a minimum data rate of 4800 bits per second per 6.25 kHz of bandwidth.[42]

(1) Alternative Showings

20. *Petitions.* Advanced Meter Reading Technologies (AMRT), Schlumberger Meter Communication Systems (Schlumberger), and UTC request that the type acceptance rules be amended to allow alternative showings of spectrum efficiency for low power frequency reuse systems.[43] AMRT contends that multiple low-power, low-speed transmitters can serve more homes than a single high-power, high-speed transmitter and with less impact to adjacent channel operations. It suggests a formula to compute a minimum data rate for these systems based on antenna height, channel bandwidth, and a frequency reuse ratio.[44] Finally, Metroplex asks the Commission to consider the efficiencies that can be obtained using bit rates slower than specified in the efficiency standard. Metroplex contends that the efficiency standard is arbitrary and that the effective information throughput using the efficiency standard may be lower than can be accomplished with a more efficient non multi-level modulation technique.[45] No oppositions were filed in response to any of these requests.

21. *Discussion.* Our adopted approach has the benefit of being easy to measure and therefore simple to enforce. While AMRT's approach has the benefit of tailoring the minimum bit rate to individual system parameters, it would place unreasonable burdens upon manufacturers as well as the Commission because of the requirement to type accept many radios, each

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[41] *See R&O* at para. 97.

[42] *See* para. 15, *supra.* for a discussion regarding the transition dates.

[43] AMRT Petition for Reconsideration at 4; Schlumberger Petition for Reconsideration at 5; UTC Comments on Petitions for Reconsideration at 8.

[44] AMRT Petition for Reconsideration at 5.

[45] Letter from Metroplex Mobile Data, Inc. to William F. Caton, Acting Secretary, Federal Communications Commission (FCC), dated September 12, 1995.

Accordingly, these channels, similar to the bandwidth restrictions imposed on most other former low power offset channels, will be subject to limitation 24,[153] rather than Limitation 46.

66. In response to requests for clarification regarding specific channels, we reexamined all channels that were reallocated from one radio service to another and made several changes to the frequency tables to correct errors. Additionally, in the Police Radio Service, eligibility for use of 460.0125 MHz, which is currently restricted to current licensees only,[154] has been modified to allow use by new low power licensees.[155] New high power stations on 460.0125 MHz will continue to be prohibited in order to protect adjacent Domestic Public Radio users who operate under Part 22 of our rules. Finally, we have added 467.9375 MHz to the Business Radio Service but restricted it to low power use in order to protect an adjacent 12.5 kHz color dot channel.[156] Appendix B is a table of the reallocated channels in each radio service.

(2) Operation and Licensing Requirements

67. The *R&O* provided several operational alternatives for licensees authorized on the former low power offset channels. One option is to remain on their current channels and achieve primary status by providing sufficient justification to raise power. A second option is to migrate to designated low power channels and achieve primary status on those channels. A third option is to remain on their current channel at low power and continue to have secondary status.[157]

68. *Petitions.* AICC contends that licensees should be able to attain primary status without raising power because "[m]aking licensees increase power for the sole purpose of achieving primary status on the channel runs counter to the Commission's desire to obtain maximum use of the channels ...".[158] Additionally, AICC asks whether stations wishing to increase power need to file a letter notification or an application to provide coordinates.[159] Finally, AICC suggests that the Commission continue to allow the current practice for alarm transmitters of providing coordinates for the center of an operating area and the radius around

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[153] Limitation 24 specifies a maximum authorized bandwidth of 11.25 kHz.

[154] *See* 47 C.F.R. § 90.19.

[155] This channel was a low power offset channel under the former 47 C.F.R. § 90.267.

[156] This channel was a low power offset channel under the former 47 C.F.R. § 90.267.

[157] *See R&O* at paras. 62-65.

[158] AICC Petition for Reconsideration at 5.

[159] AICC Petition for Reconsideration at 3.

Before the
Federal Communications Commission
Washington, D.C. 20554

In the Matter of	)	
	)	
Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them	)	PR Docket No. 92-235
	)	
and	)	
	)	
Examination of Exclusivity and Frequency Assignments Policies of the Private Land Mobile Services	)	

SECOND REPORT AND ORDER

Adopted: February 20, 1997 **Released: March 12, 1997**

By the Commission:

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Title **Paragraph**

of the current licensing freeze,[165] and low power users want assurance that they will be protected from interference by high powered operations before switching channels. Accommodating these competing interests while establishing a workable low power frequency plan is not a trivial matter. In major metropolitan areas, the demand for both high power and low power operations exceeds the number of frequencies available. Moreover, it is highly likely that such high power and low power needs will vary based on geographic location. In this connection, we believe that the coordinators will need some time to analyze the current use patterns of these offset channels and determine a compromise solution between the two types of operations.[166] Therefore, in accordance with the recommendation of LMCC, we will give the coordinators in each of the two pools six months from publication of this *Second Report and Order* in the Federal Register to develop a consensus plan for low power operations in their respective pools.[167]

64. HP recommended that we codify the basic aspects of the plan fashioned by the coordinators (*e.g.*, by setting forth in our rules the frequencies designated for low power operation). In the *R&O*, we delegated to the frequency coordinators the authority to designate low power frequencies; our decision was not to specify such frequencies in the rules. We continue to believe that this approach provides the frequency coordinators, who have knowledge of user requirements and local conditions, with maximum flexibility in the management of the PLMR spectrum. Further, this allows frequencies to be easily added or subtracted from the designated list as may be warranted. We find nothing in the record at this time that persuades us to change this approach. Further, consistent with this approach, we will leave it up to the coordinators whether to designate contiguous spectrum or to specify individual channels (non-contiguous spectrum) for low power operations. Low power operation on the designated channels will be protected through coordination and the Commission's licensing process.[168] As specified in the *R&O*, frequency coordinators will be required to maintain a list of low power channels and make it available to the public upon request.[169] We encourage the frequency coordinators to periodically review the low power channel plan and modify it when appropriate. If a consensus

[165] *See supra* note 155.

[166] SpaceLabs, a manufacturer of low power biomedical telemetry equipment, has expressed a willingness to work with the high power industry to devise a plan that will advance the interests of all PLMR users. *See* SpaceLabs Comments to Blueprint.

[167] In this connection, LMCC has established a working group to examine issues related to licensing and regulation of low-power frequencies. Although the LMCC working group has not completed its task and LMCC has not filed any proposals with the Commission, ITA incorporates key provisions of the tentative LMCC plan into its Blueprint. This plan calls for fifty channel pairs of coordinated low-power spectrum and twenty-five channel pairs for itinerant low-power use. *See* ITA Blueprint at 6-7.

[168] Once accepted and approved by in-pool coordinators, a mutually agreed upon coordinator plan for low power channels will be fully supported by the Commission.

[169] *See R&O*, 10 FCC at Rcd 10110.

regarding the establishment of a low power channel plan cannot be reached, we will revisit this issue.

2. Time Frame for Migration

65. In addition to its recommendation that the frequency coordinators be given six months to determine which channels should be designated for low power use, LMCC recommends several steps to ensure that the migration of low power users from their current channels to these new designated channels occurs smoothly. These suggested measures include (1) low power offset licensees being given six months to declare their intent to convert to primary status by either registering their coordinates[170] or by modifying their license to operate on the designated low power channels;[171] and (2) providing seven months for offset licensees to migrate to the designated channels.[172] We agree with LMCC that low power users should be able to attain primary status on these offset channels if they so desire by modifying their licenses to specify transmitter coordinates so that frequency coordinators know the location of such systems and can take them into account when making frequency recommendations. In this connection, we will confer primary status on licensees operating on the former low power offset channels that already have provided their coordinates to the Commission.[173] These licensees should notify the Commission at the time of their license renewal that they are operating in this manner. This will give offset licensees the flexibility to remain on their current licensed frequency or change to a new low power frequency. Because these channels are available for high power operation, however, licensees that remain on their current licensed frequency may have to share it with a new high power user. Therefore, we expect that the majority of low power users will be inclined to migrate to the new low power channels once they are identified in order to reduce the chance of interference from co-channel high powered operations.

66. Further, contrary to LMCC's contention, we do not believe that low power users should be required to declare their intent to migrate to low power channels or modify their license to obtain primary status within a certain time frame. We believe the decision whether or not to

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[170] Under the rules prior to the *R&O*, all stations using a low power offset frequency under 47 C.F.R. § 90.267 were licensed as mobiles. These stations, however, were permitted to serve the functions of base, fixed, or mobile relay stations. Because these stations were licensed as mobiles regardless of the type of function they actually served, applicants were required only to provide a central coordinate and a point radius defining their area of operations. Thus, frequency coordination on these frequencies is very difficult because the coordinators do not necessarily know exactly where stations are actually located.

[171] In LMCC's plan, this step would occur prior to the coordinators designating any channels. *See* LMCC Comments at 12.

[172] LMCC Comments to *Further Notice* at 12-13.

[173] Although not required, many licensees supply coordinates on their initial license application.

migrate or obtain primary status is a business decision and best left up to individual licensees to make within their own time frame according to their individual requirements. Additionally, because the designated channels, in some cases, may be the same channels that many low power users are already using,[174] licensees would not be able to make informed decisions regarding migration until channels are designated. Therefore, we decline to require current low power users to declare their intent to migrate to dedicated low power channels or modify their license to obtain primary status by a certain date.

67. We do agree, however, with LMCC's suggestion to give licensees on the low power channels a chance to migrate before licensing high power operations on these channels. The PLMR community believes seven months is a reasonable amount of time for offset licensees to decide whether to switch to new low power channels.[175] Therefore, in this connection, we will provide a period of seven months for low power users to migrate to new low power frequencies. Additionally, concurrent with the end of this migration period[176] we note our intention to lift the current licensing freeze in the 450-470 MHz band[177] and allow new high power systems to be licensed on any former 12.5 kHz offset channel not specifically designated for low power use.[178] We will not lift the freeze, however, if a consensus plan has not been established. In the interim, we will grant partial relief and permit the licensing of high power systems on these channels, provided that the license applications are accompanied by a statement from the frequency coordinator attesting that operation of a new high powered system will not impact any currently operating co-channel low power system. If interference to a low power system from a high power operator using the offset frequencies does occur prior to the end of the migration period, the high power licensee will be expected to remedy the situation through any means possible, including shutting its system down.

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[174] These licensees would not be required to move to obtain a primary designation.

[175] LMCC Comments to *Further Notice* at 12-13.

[176] Assuming a consensus low power plan is established prior to the effective date of the rules, the seven-month migration period starts when the rules become effective.

[177] We are not addressing the freeze on licensing new high powered stations in the 421-430 and 470-512 MHz bands at this time. *See Public Notice*, Freeze on the Filing of Applications for 12.5 kHz Offset Channels in the 421-430 MHz and 470-512 MHz Bands (PR Docket 92-235, FCC 95-255), DA 95-1839, released August 22, 1995. This freeze, unlike the freeze at 450-470 MHz, was instituted in response to concerns from LMCC that the coordinators lacked information to make informed frequency recommendations regarding the assignment of the new channels. We will consider lifting this freeze at such time as the coordinators agree upon technical standards. *See* para. 43, supra.

[178] The former 12.5 kHz offset channels will only be authorized for use with equipment that operates on channels of 12.5 kHz or less. *See R&O*, 10 FCC Rcd at 10094.